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ABSTRACT

All learning takes place through the unification of body and mind. Within the realm of motor skill learning, the term mental practice has been used to explain this phenomenon. It has been found that individuals can use their imaginations to learn and to improve upon their performance. Mental practice can be used by teachers who have too little equipment and time, and many students. The following five principles of mental practice are particularly significant to the acquisition of motor skills: (1) The learner must have some prior experience with the task or a similar task; (2) The learner must be able to symbolize performance or movement by words and concepts; (3) The learner must be instructed in proper techniques of mental practice; (4) Mental practice is most effective when used in conjunction with physical practice; and (5) Mental practice sessions should not exceed five minutes if concentration is to be maintained. (JD)

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MENTAL PRACTICE FOR SKILL ACQUISITION

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All learning takes place through the unification of body and mind (Vedelli, 1979). Within the realm of motor skill learning the term mental practice has been used to explain this most fascinating phenomenon. Not only can individuals learn by imagining, they have also been found to improve upon their performance (Jokl, 1966). Researchers have also found that these processes can actually produce measurable contractions in the muscle groups used in the imagined movement (Jacobson, 1932; Shaw, 1938). Therefore, mental practice can and should be used by all teachers concerned with too little equipment, too many students and too little time.

But how does mental practice work? In the initial stages of skill acquisition the learner needs to understand what must be done (Robb, 1972). It is at this point that the teacher needs to emphasize the thinking through of a skill (Lay, 1979). This thinking through is essential for the only pure motor part of a perceptual motor skill is the actual muscle contractions which represents a very small part of the total process of organizing, initiating and controlling of the movement (Marteniuk, 1976). Teachers must treat the early stages of motor skill acquisition as cognitive in nature (Robb, 1972; Marteniuk, 1976). At this point it is the teacher's role to pick out the cognitive aspects and to use verbal cues to help the learner intellectualize the skill (Robb, 1972). It is at this cognitive level of skill acquisition where mental practice is most effective (Marteniuk, 1976).

In mental practice, as in the beginning stages of learning, the student is concerned with the mechanics of the skill (Jokl, 1966). Therefore, in order to have effective mental practice during acquisition, attention should primarily be directed towards mechanics rather than towards goals and outcomes. Attention can quite adequately be concentrated on mechanics by using film loops or demonstrations. By watching others perform the to be learned skill, the learner sees what the appropriate response is to be thereby enhancing understanding (Marteniuk, 1976).

The demonstration can also serve the purpose of helping the learner plan the action that is to be learned. Each skill involves a very specific plan which is a logical progression of basic skills or movements. Therefore, the demonstration gives the learner a grasp on the sequencing or the stringing together of components (Robb, 1972; Stallings, 1973; Marteniuk, 1976). For example, watching a golfer's swing helps the

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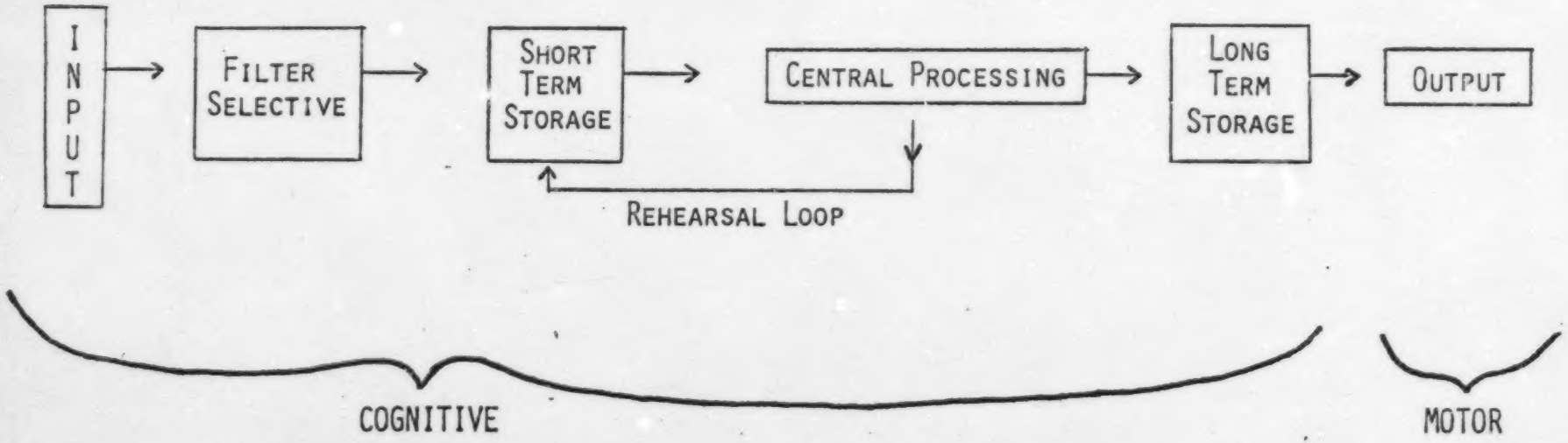

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FIGURE 1. MODIFIED VERSION OF WELFORD'S INFORMATION PROCESSING MODEL

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learner visualize the sequence of force (Robb, 1972), or in gymnastics it helps the gymnast visualize the putting together of a floor exercise. Though the overt manifestations of a golf swing or a floor routine are motor in nature, they have a very large mental or cognitive component that influences much of the processing of information concerned with learning. A modified version of Welford's Information Processing model (Stalling, 1973, p. 51) can be used to explain the "workings" of mental practice (see Figure 1).

A. Input - It is at this point where the learner is presented with the material to be learned. The teacher gives audio information by way of explanation and visual information by way of films, pictures and demonstrations. This information is then passed on to the selective filter.

B. Selective filter - acts to "filter" out irrelevant or extraneous material which the learner need not attend to. Once the individual has sorted out what must be attended to, as in the case of the beginner who needs to attend to the actual movement and not its outcome, it is sent on to the short-term store.

C. Short-term store - The individual can either choose to retain or forget the information. However, the short-term store holds information for a maximum of 30 seconds so if the learner wishes to retain the information it must rapidly be passed on to central processing.

D. Central processing - acts as the main body or storage system for the human computer where the response is organized and initiated. The initiated response is then passed along to the motor output to produce the desired action.

However, all too often the learner is unable to immediately transfer information from the short-term store to the central processing. Therefore, the practice loop must be called into service. The individual can mentally practice or think through the skill when actual physical practice is not possible (Stallings, 1973). And how often does that happen? In cases of too many students and too little equipment where students are lined up, how can the fourth or fifth, or even second student on the line, be expected to perform well if that 30-second limit has been exceeded by three or four minutes?

In teaching students to use mental practice techniques, as in teaching anything, the teacher needs to direct the student's attention to relevant cues (Robb, 1972). It is the teacher's responsibility to select what cues the learner must attend to and then to make every effort to help the student attend (Robb, 1972). Film loops help to focus the student's attention to essential information. However, a word of caution regarding

film loops. First, the film must be appropriate to the level of the learner (Robb, 1972). As in the case of the beginner, films designed for this level present the material in a very closed format whereby repeated presentations of the basic movement are the focal point of the film. In contrast, the more advanced level performer should view films depicting gamelike situations because basic skills are no longer the issue, whereas strategies and plays are now the focus of attention.

Another source of mental practice involves having students either overtly or covertly repeat the requirements of the skill (Marteniuk, 1976). This would help instructions to become fixed in memory through repetition (Marteniuk, 1976). This type of practice can occur through:

A. summaries at the end of class
B. questioning students about the essential points of the lesson
C. reviews at the beginning of class

Teaching stations can also be set up as an integral part of the teaching process. One station could expressly be used for mental practice. It should contain:

A. mats - so that students could relax, close their eyes and focus their attention on mentally practicing the skill
B. written instruction sheets - whereby the teacher can direct the mental practice process for those individuals who might have trouble pinpointing exactly what must be attended to
C. posters and film loops - which give accurate mechanical analysis of the skill
D. audio-tapes - for those individuals who process verbal cues better than visual cues. The teacher could verbally direct attention to specific body parts and positioning.

In summary, five principles of mental practice can be identified which are particularly significant to the acquisition of motor skills.

Principles of Mental Practice

1. The learner must have some prior experience with the task or a similar task.

2. The learner must be able to symbolize performance or movement by words and concepts.

3. The learner must be instructed in proper techniques of mental practice.

4. Mental practice is most effective when used in conjunction with physical practice.

5. Mental practice sessions should not exceed five minutes if concentration is to be maintained.

In closing, all acquired skills are characterized by "accompaniment of mind." In the initial stages of practicing a new task, awareness may be concentrated exclusively on the mechanical aspect of the act--but with increasing skill...the motor event becomes progressively more automatic so that the mind can concern itself primarily with its aims and objectives (Jokl, 1966, p. 23).

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